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Self-reported Participation in Sport and Exercise among Adolescents and Young Adults with and without Mild/Moderate Intellectual Disability

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Abstract

Background. Physical inactivity is a leading risk factor for mortality. Adults with intellectual disability are extremely inactive but less is known about physical activity levels in children and youth with intellectual disability. This paper looks at participation in sport and exercise by adolescents and young adults with and without mild to moderate intellectual disability.

Methods. Secondary analysis was undertaken of *Next Steps*, an annual panel study that followed a cohort from early adolescence into adulthood. 527 participants with mild to moderate intellectual disability were identified through data linkage with educational records.

Results. Sport/exercise participation rates were consistently lower for adolescents and young people with mild/moderate intellectual disability than for their peers without intellectual disability. Matching participants on between-group differences in exposure to extraneous risk factors did not impact on these between group differences in participation in sport/exercise.

Conclusions. The results support limited existing evidence regarding the low level of participation of children and young people with intellectual disability in sport/exercise compared to their peers. Future work on promoting sport/exercise and physical activity in children and young people with intellectual disability may play a role in helping to reduce the health inequalities experienced by people with intellectual disability.

Introduction

The regular practice of physical activity and sport provides both men and women, of all ages and conditions, including persons with disability, with a wide range of physical, social and mental health benefits [1]. Physical activity is defined as any bodily movement

produced by skeletal muscles that results in energy expenditure [2]. Exercise is a subcategory of physical activity that is planned, structured, repetitive, with the objective of improving or maintaining physical fitness [2]. Sport is a subset of exercise where participants adhere to a common set of rules or expectations, and a defined goal exists [3].

The World Health Organization identifies physical inactivity as the fourth leading risk factor for global mortality [4]. It is noted that participation in regular physical activity reduces the risk of coronary heart disease and stroke, diabetes, hypertension, colon cancer, breast cancer and depression. It is also fundamental to energy balance and weight control, positively related to cardiorespiratory fitness and muscular strength, and bone-loading physical activity increases bone mineral content and bone density [4]. Sport is one of the domains through which people can be physically active [5] with sport also having a role in promoting psychological well-being and increasing social capital [6].

Intellectual disability refers to a significant general impairment in intellectual functioning that is acquired during childhood, typically operationalised as scoring more than two standard deviations below the population mean on a test of general intelligence [7]. While estimates of the prevalence of intellectual disability vary widely, it has been estimated that approximately 2% of the adult population have intellectual disability [8,9]. A systematic review of physical activity levels in adults with intellectual disability found that they are 'incredibly inactive' with only 9% of participants across 15 studies achieving minimum physical activity guidelines [10]. More severe intellectual disability was the strongest predictor of not meeting physical activity guidelines. Lack of physical activity excludes people with intellectual disabilities from the above noted general benefits of physical activity. It also excludes them from the documented benefits of physical activity specifically for youth with developmental disabilities (including but not restricted to intellectual disabilities) which include

improvements in aerobic capacity, improved gross motor function, and high levels of participant/parent satisfaction[11]. In addition, lack of physical activity in people with intellectual disability has been linked to cardiac atrophy [12] and is likely to be linked to high reported obesity rates in children and adults with intellectual disability [13,14-16].

Research has mostly focused on physical activity in adults with intellectual disability (e.g., [17,18,19]) and there is little evidence on physical activity levels in children and youth with intellectual disability [20]. For children and adolescents with physical disabilities, intellectual impairment has been found to be consistently and negatively associated with physical activity [21]. Small scale studies have reported low levels of physical activity in adolescents and young adults with mild to moderate intellectual disability, especially women [22] and children and young people with intellectual disability [23-25]. A larger scale study in Taiwan found that less than one third of adolescents with intellectual disability took part in regular physical activity and only 8% met Taiwanese recommendations for physical activity [26].

Little is known about the extent of and factors associated with participation in sport by either adults or children with intellectual disability. One large scale survey of adults with intellectual disability in England found that 59% of participants had not participated in sport at all in the last month and of these, over a third said that they would like to [27]. Participants who were poor, living in more deprived neighbourhoods and who felt unsafe in the area where they live were less likely to take part in sport. In the United States, 6-8 year old children with intellectual disability participated in a lower number of sports than children without intellectual disability and number of sports was positively related to maternal education and positive perceptions of the impact of the child on the family, and negatively to maternal employment [28]. Children with intellectual disability have also been reported to be less likely to take part in 2 or more hours per week of organized sport after school than

children without intellectual disability, with most children with intellectual disability taking part in low intensity sport [29].

In this paper, we present the results of a secondary analysis of a large scale survey which includes information relating to participation in sport and exercise by adolescents and young adults with and without mild to moderate intellectual disability. The aims of this paper are threefold: to compare participation in sport and exercise by those with and without mild to moderate intellectual disability; to identify socio-demographic predictors of participation; and to estimate the extent to which any between-group differences in participation may be attributable to between-group differences in exposure to extraneous risk factors.

Method

This paper is based on a secondary analysis of data collected in Waves 1 to 7 of *Next Steps* (formerly known as the Longitudinal Study of Young People in England) [30]. *Next Steps* is an annual panel study that followed a cohort from early adolescence into adulthood. It has collected information about their education and employment, economic circumstances, family life, physical and emotional health and wellbeing, social participation and attitudes. *Next Steps* data has also been linked to the Department for Education's National Pupil Database (NPD). *Next Steps* is currently managed by the Centre for Longitudinal Studies at University College London and is funded by the Economic and Social Research Council. Prior to 2013 it was managed and funded by the Department for Education. *Next Steps* data files and documentation were obtained from the UK Data Service. Full details of the method and design of *Next Steps* are available in a series of user guides [31]. Key aspects are summarised below.

Sampling

Fieldwork commenced in 2004 when the sampled children were aged 13-14 (school year 9). The initial (Wave 1) sample was drawn from a sampling frame based on children attending maintained schools, independent schools and pupil referral units in England who in February 2004 were in Year 9 (or equivalent) and were born between 1 September 1989 and 31 August 1990. Schools in deprived areas and students from minority ethnic groups were oversampled. At Wave 1, 73% of selected school's participated leading to an issued sample of approximately 21,000 young people. The attained sample at Wave 1 was 15,770 children (75% response rate). This cohort was followed-up every year until 2010 (age 19-20).

Identification of Participants with Mild to Moderate Intellectual Disability

Data linkage with the 2004 and 2006 NPD was undertaken to identify participants with Special Educational Needs (SEN). Linkage was successful for 15,240 young people present at Wave 1 (97% of the *Next Steps* sample). Linkage included data on stage of assessment and primary/secondary category of Special Educational Needs (SEN). Following the example of previous studies [32,33], we used the SEN category of Moderate Learning Difficulty (MLD), if the child was at the School Action Plus stage of assessment of SEN or had a formal Statement of SEN, as an indicator of mild to moderate intellectual disability. School Action Plus and Statements require the involvement of professionals external to the school in the categorisation of SEN. Current guidance defines MLD in relation to pupils having 'attainments significantly below expected levels in most areas of the curriculum despite appropriate interventions [and having] ... much greater difficulty than their peers in acquiring basic literacy and numeracy skills and in understanding concepts' [34].

Of the children sampled, 527 (3.5% of unweighted linked sample) were identified as having mild to moderate intellectual disability in either 2004 or 2006. Consistent with the

data from existing epidemiological research, the prevalence of mild to moderate intellectual disability was significantly higher among males than females (4.3% vs 2.5%; Prevalence Ratio=1.75 (1.46-2.09)) and among children who were eligible for free school meals, an indicator of household poverty, (8.0% vs 1.9%; Prevalence Ratio =4.10 (3.14-5.35)) [8,35,36]. The numbers interviewed at each Wave were: Wave 1=527, Wave 2=415, Wave 3=354, Wave 4=314, Wave 5=256, Wave 6=241 and Wave 7=206. Further information on rate and predictors of sample retention can be found in online supplementary material for this article.

Procedure

Data in the first four waves were collected by face to face interviews using computer assisted personal interviewing with the young person themselves and their parents. Waves 5-7 used a mixed mode approach in which information, which was only collected from the young person, was collected by their choice of method (online, telephone or face to face).

Measures

Exercise

At Waves 1, 2 and 4 (Waves 3 and 5 did not include questions on sport/exercise participation) participants were asked: *How often do you do sports like football, aerobics, dance classes or swimming - is it...* (response options: *1. Most days, 2. More than once a week, 3. Once a week, 4. Less than once a week, 5. Hardly ever, 6. Never)?* At Waves 6 and 7 participants were asked: *How often do you do any kind of physical exercise? This could include things like cycling, going to the gym, going for long walks, dance classes, playing football or any other kind of sports* (response options same as for Wave 1-4 question)? From these data we created two binary variables at each Wave; **frequent exercise** (response options most days/more than once a week vs. rest), **exercise** (response options most days/more than once a week/once a week/less than once a week vs. rest).

Socio-Demographic Variables

Family socio-economic position (SEP)

Linkage to the 2004 (Wave 1) and 2006 (Wave 3) NPD included linkage to data on eligibility for free school meals (FSM). Eligibility for FSMs is determined by data linkage to government records of receipt of at least one of a defined list of means-tested welfare benefits by the child's parent(s). It should be noted that this indicator is of eligibility for, not uptake of, free school meals. We created a binary variable of **FSM eligibility** scored 1 if the child was eligible at Wave 1, Wave 3 or both Waves of *Next Steps* and scored 0 if the child was not eligible at both Waves. FSM eligibility is a commonly used proxy indicator of low household socio-economic position [37].

We extracted data from *Next Steps* on the employment status of parental figures living in the household at Waves 1-4 inclusive. We created a binary variable of **living in a workless household** scored 1 if no resident parental figure was in employment or full time education at any of the four Waves and scored 0 if at least one resident parental figure was in employment or full time education in each of the four Waves.

Young adult socio-economic position

We extracted data from *Next Steps* on the self-reported employment, education and training status of the young person at Waves 5-7. We created a binary variable of **not in employment, education or training (NEET)** scored 1 if the young person was not in employment, education or training at any of the three Waves and scored 0 if they were in employment, education or training in each of the three Waves.

Household composition

We extracted data from *Next Steps* on household composition at Waves 1-4 inclusive. We created a binary variable of **single parent household** scored 1 if only one parental figure

was resident at any of the four Waves and scored 0 if two parental figures were resident in each of the four Waves.

Area deprivation

Linkage to the 2004 (Wave 1) and 2006 (Wave 3) NPD also included linkage to data derived from the postal code of the child's residence to the Income Deprivation Affecting Children Index (IDACI) [38]. IDACI scores are the percentage of children in each Lower Level Super Output Area (LSOA) that families live in that are considered income deprived. Income deprivation is defined by receipt of means-tested welfare benefits. LSOAs are neighbourhoods with an average population of 1500 (range 1000-3000). IDACI scores were transformed into sample quintiles. We created a binary variable of **High Neighbourhood Deprivation** scored 1 if the child was living in the lowest IDACI quintile at Wave 1, Wave 3 or both Waves of *Next Steps* and scored 0 if the child was not living in the lowest IDACI quintile at both Waves.

Peer victimisation

We extracted data from *Next Steps* child self-reported experience of peer victimisation (bullying) at Waves 1-3. At each of these waves children were asked about exposure to five types of peer victimisation experienced in the last 12 months: (1) *Have you ever been upset by being called hurtful names by other students, including getting text messages or emails from them? (2) Have you ever been excluded from a group of friends or from joining in activities? (3) Have other students at your school ever made you give them money or personal possessions? (4) Have other students ever THREATENED to hit you, kick you or use any other form of violence against you? (5)Have other students ever ACTUALLY hit you, kicked you or used any other form of violence against you?*

If the young participant selected a 'yes' option they were then asked about the frequency of exposure (response options: every day, a few times a week, once or twice a week, once every two weeks, once a month, less often than this, it varies). Preliminary analysis of responses indicated a strong association between threat of and actual violence, but weak associations between other forms of peer victimisation. As a result we combined self-report of threat of or actual violence at each of the three Waves. For each of the four types of peer victimisation (**name calling, social exclusion, theft, violence**) we created one binary variable; whether this had happened at all in any 12 month period in Waves 1-3 (contrasted with it having never happened in any of the three Waves).

Friendships

We extracted information on friendships from Waves 2, 6 and 7 of *Next Steps*. At Wave 2 participants were asked: *When you have free time, do you mainly: (1) Go out somewhere with friends; (2) Go round to a friend's house (or friends come round to yours); (3) Spend time with brother(s)/sister(s); (4) Spend time with other members of your family or; (5) Spend time by yourself?* We created a binary variable, **W2 spends time with friends**, scored 1 if they selected option 1 or 2, scored 0 if they selected options 3-5.

At Waves 6 and 7 participants were asked: *How many close friends do you have – that is friends you could talk to if you were in some sort of trouble?* We created a binary variable, **W6/7 few friends**, scored 1 if they reported at either Wave they had no or only 1 close friend and scored 0 if they reported at any Wave they had two or more close friends.

Approach to Analysis

In the first stage of analysis we made simple bivariate comparisons between participants with and without intellectual disability with regard to frequency of participation in sport/exercise. In the second stage of analysis we investigated, for the

outcome ‘frequent participation in sport/exercise’, the strength of association between socio-demographic factors and participation separately for participants with and without intellectual disability. Missing data among socio-demographic variables was imputed using multiple imputation routines in SPSS 22 to create five parallel imputed data sets. The subsequent analysis used the following approach: (1) five blocks of variables were created (SEP, neighbourhood, family type, peer victimisation, friendships) and entered sequentially; (2) variables within blocks were entered in order of bivariate strength of association with the outcome of interest; (3) variables were only retained in the model if *at the point of entry* they were significantly related to the outcome of interest or had a prevalence ratio of 1.50 or greater. Poisson regression with robust standard errors was used to estimate prevalence ratios uniquely associated with each variable in the model [39,40].

In the final stage of analysis we estimated the strength of association between intellectual disability and frequency of participation in sport/exercise while controlling for between group differences in exposure to socio-demographic variables that have been established as important social determinants of poorer health. We used Propensity Score Matching routines in SPSS 22 to match each participant with intellectual disability with a participant without intellectual disability with a similar propensity score for intellectual disability based on exposure to socio-demographic variables [41-43]. We used the lowest tolerance for matching (0.05) that allowed complete matching for all participants with intellectual disability.

Results

Frequency of participation in sport/exercise for participants with and without intellectual disability

(Table 1 Here)

At all Waves frequency of participation in sport/exercise on the original ordinal measure was higher among participants without intellectual disability. At four of the five Waves this difference was statistically significant (W1 Mann-Whitney $z=5.06$, $p<0.001$, W2 Mann-Whitney $z=5.71$, $p<0.001$, W4 Mann-Whitney $z=3.43$, $p<0.001$, W7 Mann-Whitney $z=5.96$, $p<0.001$). Unadjusted and adjusted (see below) prevalence ratios are presented in Table 1 for the two derived binary measures of participation separately for males and females at each Wave. At all Waves and for both measures of participation, females with intellectual disability were more disadvantaged in relation to participation (when compared to their peers) than males with intellectual disability.

Predictors of participation in sport and exercise among participants with intellectual and without intellectual disability

(Table 2 Here)

Analyses of socio-demographic predictors of frequent sport/exercise were undertaken separately for males and females with and without intellectual disability at Waves 2 (contemporaneous with friendships indicator) and 7 (most recent).

At Wave 2 (age 14/15) males with intellectual disability were more likely to frequently participate in sport/exercise if they were not being bullied and if they tended to spend their spare time with friends. Females with intellectual disability were more likely to frequently participate in sport/exercise if they were not being bullied and if they lived in an area of high social deprivation. While the latter effect was not statistically significant it would

generally be considered to be a moderate effect size. Interestingly, the opposite association between participation and area deprivation was evident among females without intellectual disability (higher participation if not living in an area of high social deprivation).

At Wave 7 (age 19/20) males with intellectual disability were more likely to frequently participate in sport/exercise if they had frequently participated in sport at age 14/15, had been brought up in a single parent household and had been bullied. No variables significantly predicted participation for females with intellectual disability.

Frequency of participation in exercise when controlling for differences between people with and without intellectual disability in family circumstances and exposure to peer victimisation

(Table 3 Here)

As expected (see Table 3), participants with intellectual disability were significantly more likely than their peers to be brought up by lower SEP families, live in more socially deprived neighbourhoods, be bullied and to have fewer friends. However, matching on these factors had no impact on between-group differences in frequency of participation in sport/exercise (see final column of Table 1).

Discussion

Sport/exercise participation rates were consistently lower for adolescents and young people with mild/moderate intellectual disability than for their peers without intellectual disability. Differences were particularly marked for Waves 1, 2 and 4 where questions only asked about sports participation (as opposed to sport and any physical exercise in Waves 6 and 7). Further, females with intellectual disability were more disadvantaged in relation to participation (compared to females without intellectual disability) than males. Matching

participants on between-group differences in exposure to extraneous risk factors did not impact on these between group differences in participation in sport/exercise.

Predictors of frequent participation in sport/exercise varied between those with and without intellectual disability and between males and females. However for males both with and without intellectual disability at age 14/15, those who spent spare time with friends and were not bullied with threats of or actual violence were more likely to participate in sport/exercise frequently. Females with intellectual disability at age 14/15 were twice as likely to take part in sport/exercise frequently if they were not bullied with threats of or actual violence. It is unclear why high neighbourhood deprivation appeared to have a different association to frequent participation in sport/exercise for females with and without intellectual disability. Future research could consider the association of a wider range of variables (e.g. ethnicity, disability) to participation in sport/exercise.

The study has a number of strengths including: (i) the use of a large population-based sample that (with appropriate weights) is reasonably representative of children attending maintained and independent schools in England, (ii) the use of multiple and robust measures of household and neighbourhood disadvantage and (iii) the use of multiple imputation methods to take account of item non-response on socio-demographic variables. However, there are a number of limitations to this analysis. First, mild/moderate intellectual disability was ascertained from educational administrative status (SEN of MLD). While this categorization shows expected associations with gender and socio-economic disadvantage and provides similar prevalence rates to mild/moderate intellectual disability [36], the degree of correspondence between the two constructs has not been formally validated. Second, FSM eligibility is a relatively crude indicator of family socio-economic position [37]. Third, data are based on retrospective recall of participation in sport/exercise. Fourth, measurement of

participation in sport/exercise is based on responses to a single question, the wording of which varied over different waves, with the question for waves 6 and 7 being more inclusive of any physical exercise than that for waves 1, 2 and 4 which focused on sport. Large scale research employing validated measures of physical activity, such as the International Physical Activity Questionnaire [44], and further smaller scale studies using objective measures of physical activity such as accelerometers, would help to increase the evidence base on this topic.

Despite these limitations, this paper adds to the limited evidence regarding participation in sport/exercise by younger people with intellectual disability. It is clear that adolescents and young adults with mild to moderate intellectual disability participated in less sport/exercise than peers without intellectual disability, with the difference being particularly marked for sports and for females. In light of the health inequalities experienced by people with intellectual disability [45] it is important that this crucial part of a healthy lifestyle is promoted in children and young adults with intellectual disability. Suggested strategies for increasing physical activity in this population include reward systems, a 'buddy' system, and recording progress on wall charts [46]. However, the research evidence base for how to improve participation in physical activity among people with intellectual disability is under-developed [47]. A recent trial of a walking programme to increase physical activity in adults with intellectual disability (mainly with mild to moderate intellectual disability) found no change in walking or other secondary outcomes [48]. The authors note that increasing physical activity may require more intensive programmes or upstream approaches to address the multiple social disadvantages experienced by people with intellectual disability [48].

Common barriers to physical activity for people with intellectual disability include cost, transportation, lack of support, lack of awareness of options and risk assessment

concerns [49]. A recent study suggests that centralization of sports clubs for children with disabilities may have contributed to low levels of physical activity in children with intellectual disability due to the travel time and dependence on parents for commuting [29]. Further, safety reasons, lack of understanding of the environment and longer travel distances to centralized schools may have contributed to those with intellectual disability being significantly less likely to walk or bike to school. Adolescents with intellectual disability are also less likely than other children to have someone with whom to do physical activity, and more likely to perceive that physical activities are too hard to learn [50]. Future studies should take into account these multiple barriers and aim to overcome the difficulties people with intellectual disability experience in participating in physical activity [51].

Conclusion

The results of this analysis support the limited evidence regarding the low level of participation of children and young people with intellectual disability in sport/exercise compared to their peers. It has been found that a physically active lifestyle starts to develop very early in childhood and that there is moderate or high stability of physical activity along the life course from youth to adulthood [52]. As such, it is important to promote physical activity in children and adolescents [53]. This is particularly important for children and young people with intellectual disability who display lower levels of sport/exercise than their peers and are likely over time to become part of the 'incredibly inactive' [10] population of adults with intellectual disability. Future work on promoting sport/exercise and physical activity in children and young people with intellectual disability may play a role in helping to reduce the health inequalities experienced by people with intellectual disability [45].

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Table 1: Frequency of participation in sport/exercise among participants with and without intellectual disability unadjusted and adjusted for differential exposure to socio-demographic variables

	Sex	Participants with intellectual disability		Other participants		Unadjusted Prevalence Ratio	Prevalence Ratio for propensity score matched groups (tolerance 0.05)
		Total n	%	Total n	%		
Frequent exercise							
W1 (age 13/14)	Males	356	61%	6931	77%	0.80*** (0.73-0.87)	0.77*** (0.69-0.85)
	Females	179	33%	6837	52%	0.63*** (0.51-0.78)	0.66*** (0.52-0.83)
W2 (age 14/15)	Males	295	55%	5956	73%	0.76*** (0.69-0.84)	0.82*** (0.72-0.93)
	Females	161	21%	5898	43%	0.49*** (0.36-0.66)	0.53*** (0.37-0.75)
W4 (age 16/17)	Males	240	41%	5161	56%	0.73*** (0.63-0.85)	0.71** (0.58-0.87)
	Females	135	12%	5157	23%	0.51*** (0.32-0.80)	0.46** (0.27-0.80)
W6 (age 18/19)	Males	199	70%	4273	75%	0.94 (0.85-1.03)	0.90 (0.78-1.04)
	Females	129	45%	4416	53%	0.85 (0.76-1.03)	0.83 (0.65-1.06)
W7 (age 19/20)	Males	166	65%	3740	77%	0.84*** (0.75-0.95)	0.77*** (0.69-0.85)
	Females	115	45%	3892	52%	0.87 (0.71-1.06)	0.66*** (0.52-0.83)
Exercise							
W1 (age 13/14)	Males	356	83%	6931	92%	0.90*** (0.86-0.95)	0.92*** (0.87-0.98)
	Females	179	67%	6837	80%	0.84*** (0.76-0.94)	0.75*** (0.66-0.85)
W2 (age 14/15)	Males	295	81%	5956	90%	0.90*** (0.85-0.95)	0.95 (0.88-1.01)
	Females	161	57%	5898	75%	0.75*** (0.65-0.86)	0.73*** (0.62-0.85)
W4 (age 16/17)	Males	240	68%	5161	80%	0.85*** (0.78-0.93)	0.85** (0.77-0.95)
	Females	135	33%	5157	51%	0.65*** (0.52-0.83)	0.58*** (0.43-0.77)
W6 (age 18/19)	Males	199	88%	4273	92%	0.96 (0.91-1.01)	0.97 (0.91-1.05)
	Females	129	74%	4416	79%	0.93 (0.84-1.03)	0.88 (0.76-1.02)
W7 (age 19/20)	Males	166	86%	3740	93%	0.92** (0.87-0.98)	0.92** (0.87-0.98)
	Females	115	65%	3892	80%	0.82*** (0.72-0.94)	0.75*** (0.66-0.85)

* p<.05; ** p<.01; *** p<.001; W1 school year 9, W2 school year 10

Table 2: Predictors of frequent participation in sport/exercise for participants with and without intellectual disability

Outcome/ Group	Variable	People with ID	People without ID
Males	Workless household		0.94* (0.88-1.00)
Wave 2	High neighbourhood deprivation		0.92* (0.86-0.99)
	Bullied (threat of or actual violence)	0.71* (0.53-0.97)	0.89*** (0.85-0.93)
	Bullied (names)		0.94* (0.90-0.99)
	Bullied (socially excluded)		0.93** (0.88-0.98)
	W2 spare time spent with friends	1.68** (1.19-2.37)	1.25*** (1.18-1.32)
Females	FSM eligibility		0.82* (0.69-0.96)
Wave 2	Workless household		0.86* (0.75-1.00)
	High neighbourhood deprivation	1.86 (0.98-3.53)	0.78*** (0.68-0.90)
	Bullied (threat of or actual violence)	0.50* (0.27-0.95)	
	Bullied (robbed)	0.46 (0.13-1.69)	
Males	W2 frequent sport/exercise	1.21** (1.05-1.40)	1.31*** (1.24-1.38)
Wave 7	High neighbourhood deprivation		0.93* (0.87-0.99)
	Single parent HH	1.17* (1.04-1.33)	
	Bullied (robbed)	1.18** (1.07-1.30)	
	W6/7 0 or 1 close friend		0.84*** (0.76-0.93)
Females	W2 frequent sport/exercise	1.17 (0.88-1.38)	1.28*** (1.20-1.36)
Wave 7	Bullied (socially excluded)		1.11** (1.05-1.18)

* p<.05; ** p<.01; *** p<.001

Table 3: Exposure of participants with/without intellectual disability to established social determinants of poorer health

	% PWID	% Others	PR adjusted for sex
Socio-Economic Position			
FSM eligible W1 or w3	45%	17%	2.82*** (2.52-3.17)
Workless HH W1-4 (any wave)	48%	19%	2.77*** (2.50-3.08)
NEET W5-7 (any wave)[a]	38%	15%	2.40*** (2.09-2.75)
Household Composition			
Single parent household W1-4 (any wave)	46%	30%	1.58*** (1.42-1.75)
Neighbourhood			
Lowest Q of IDACI W1 or W3	30%	16%	2.02*** (1.73-2.36)
Friendships			
Spare time mainly spent with friends (W2)	56%	75%	0.70*** (0.64-0.77)
No or only 1 close friend (W6 or W7)[a]	20%	8%	2.61*** (2.09-3.27)
Peer Victimisation (W1-3 any wave)			
Threatened with violence/attacked	51%	40%	1.26*** (1.15-1.38)
Robbed	16%	6%	3.00*** (2.41-3.74)
Called names etc ….	56%	41%	1.51*** (1.39-1.64)
Socially excluded	43%	30%	1.58*** (1.42-1.76)

Notes:

Data weighted using W1 cross-sectional rates unless specified

[a] Data weighted using W5-7 cross sectional weights

*** p<0.001

Supplementary Material: Self-reported Participation in Sport and Exercise among Adolescents and Young Adults with and without Mild/Moderate Intellectual Disability

Rate and Predictors of Sample Retention

Retention rates over time are presented in Table 1 for participants with/without intellectual disability.

Table 1: Retention rates for participants with/without intellectual disability

Wave	With intellectual disabilities				Without intellectual disabilities		
	N	Unweighted prevalence	% retention from W1	% retention from previous wave	N	% retention from W1	% retention from previous wave
W1	527	3.5%			14,687		
W2	415	3.2%	79%	79%	12,654	86%	86%
W3	354	2.9%	67%	85%	11,649	79%	92%
W4	314	2.8%	60%	89%	10,721	73%	92%
W5	256	2.6%	49%	82%	9,551	65%	89%
W6	241	2.6%	46%	94%	8,944	61%	94%
W7	206	2.5%	39%	85%	7,941	54%	89%

Socio-demographic factors associated with sample attrition between Waves 1 and 7 were examined separately for participants with and without intellectual disability. Predictors of attrition were broadly similar for participants with and without intellectual disability, with

male gender, membership of a minority ethnic group, household poverty (defined by FSM eligibility) and higher neighbourhood deprivation all being associated with higher rates of attrition (Groves, 2006, Groves and Couper, 1998). For the variables 'males' and 'not White British' the point estimate for attrition in the non-intellectual disability group lay (males 1.10 (1.07-1.15); not White British 1.17 (1.13-1.22)) within the 95% CI of the intellectual disability group (males 1.28 (1.09-1.51)); not White British 1.12 (0.97-1.29)). For the variables 'FSM eligibility' and 'high neighbourhood deprivation' the point estimate for non-participation in the non-intellectual disability group (FSM eligibility 1.37 (1.32-1.43); high neighbourhood deprivation 1.38 (1.30-1.40)) was greater than the upper 95% CI of the intellectual disability (FSM eligibility 1.15 (1.00-1.33); high neighbourhood deprivation 1.09 (0.94-1.26)).

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